

We Claim:

1. A method of making a composite microporous membrane comprising the steps of:

coating a nonporous precursor film with a polymer composition; and

stretching the coated nonporous precursor, the stretching further comprising a first stretching conducted at a first temperature, a first stretching ratio, and a first stretching rate, and a second stretching conducted at a second temperature, a second stretching ratio, and a second stretching rate, the first stretching rate being different than the second stretching rate.

2. The method of Claim 1 wherein the first stretching rate being greater than the second stretching rate.

3. The method of Claim 1 wherein the first stretching temperature being less than the second stretching temperature.

4. The method of Claim 1 wherein the first stretching ratio being less than the second stretching ratio.

5. The method of Claim 1 further comprising the steps of subsequently extracting a portion of the polymer composition from the stretched coated precursor.

6. The method of Claim 1 wherein coating being selected from the group consisting of coating, laminating, casting , or co-extrusion.

7. The method of Claim 1 wherein the polymer composition being selected from the group consisting of low density polyethylenes, low molecular weight polyethylenes, linear low density polyethylenes, chlorinated polyethylenes, chlorinated polypropylenes, fluoropolymers, polyamides, polyesters, polyimides, ethylene vinyl alcohol copolymers, ethylene vinyl acetate copolymers, poly(vinyl acetates), polyacetals, ethylene methlacrylate copolymers, polyketones, cellulose derivatives, polyphenylenesulfides, poly(phenyl sulfones), polyarylethersulfones, polymeric acrylkates, polymeric methacrylates, silicones, polysiloxanes, poly(vinyl chlorides, poluyppyrrols, polyanilins, polyurethanes, copolymers thereof, and mixtures thereof.

8. The method of Claim 1 wherein the first temperature ranges from 0-60°C.

9. The method of Claim 8 wherein the first temperature ranges from 20-45°C.

10. The method of Claim 1 wherein the first stretching ratio ranges from 2-100%.

11. The method of Claim 10 wherein the first stretching ratio ranges from 5-60%.

12. The method of Claim 1 wherein the first stretching rate ranges from 100-2000%/min.

13. The method of Claim 12 wherein the first stretching rate ranges from 200-1200%/min.

14. The method of Claim 1 wherein the second temperature ranges from 70-220°C.

15. The method of Claim 14 wherein the second temperature ranges from 80-150°C.

16. The method of Claim 1 wherein the second stretching ratio ranges from 50-400%.

17. The method of Claim 16 wherein the second stretching ratio ranges from 100-220%.

18. The method of Claim 1 wherein the second stretching rate ranges from 10-200%/min.

19. The method of Claim 18 wherein the second stretching rate ranges from 20-120%/min.

20. The method of Claim 1 wherein prior to stretching, applying a second nonporous precursor on said coating.